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THE SCIENTIST

Volume 10, Number 1 Spring 2007

Message from the Dean

Welcome to the first issue of The Scientist newsletter since 2003. I started as COS Dean in August of 2006, and am pleased to have the opportunity to introduce myself and to bring you up to date on the many exciting projects and accomplishments of our faculty, staff, and students.

I came to San José State from Northern Illinois University, where I was on the faculty of the Department of Biological Sciences and served as its Chair for the previous seven years. My research area is in vertebrate paleontology, specifically of dinosaurs and their close relatives, and a trend throughout my academic career has been an interest in using multidisciplinary approaches to scientific problems. Because of their popular appeal, dinosaurs have proved to be an excellent route to introducing a variety of scientific concepts, such as biological classification, continental drift, long term climatic change, extinction theory, biomechanics, and multivariate statistics.

The College of Science's focus on student success was a key factor in my deciding to come to SJSU. We have a talented, energetic faculty and staff,

and their dedication to students is evident in programs such as the summer and academic year workshops offered as part of the Alliance for Minority Participation (AMP), the outstanding first year experience programs for entering frosh (Science 2) and transfer students (Science 90T), and the workshops for probationary students in Chemistry and Computer Science. All of these programs focus on giving students who have come to SJSU to pursue careers in science and mathematics the support and tools necessary for them to succeed academically. In the 2007-2008 academic year, we will introduce mandatory advising for all College of Science students and to that end, we are in the process of setting up a central COS Advising Center.

Since arriving on campus, one of my principal focuses has been to work with Science Education Director/Associate Dean Maureen Scharberg and COS Director of Development Lauria Urbanejo in soliciting funding for the Mathematics and Science Education Resource Center (MSERC), which will be built in the southern half of the ground level breezeway of Duncan Hall.

This facility will provide a single, convenient location for all activities involving training of K-12 science and math teachers. MSERC will also allow

us to expand our service mission to include support of those already teaching science and math to K-12 students in the greater Silicon Valley region. We have also established a Regional Coordinating Council for MSERC in order to provide a venue for coordination of efforts of the many organizations in the Bay Area that are supporting efforts to encourage K-12 science and math education. The group's inaugural meeting in February brought together 33 representatives of regional school districts, corporations, institutes of higher education, and foundations that support K-12 science and math learning. The meeting was a resounding success, and was the first time many of these organizations had networked together.

After hiring no new faculty last year, we have had a very successful recruiting year thus far in 2006-2007 (see p. 8). We look forward to these talented young scholars



Dr. J. Michael Parrish, Dean, College of Science

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The College of Science

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Message from the Dean

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bringing their expertise and energy to our college.

As you have probably heard by now, 2007 marks the 150th year of San José State University, and there will be many events throughout the year celebrating this landmark. Please mark your calendars for two events of special interest to COS friends and graduates. On Tuesday, April 24, Emeritus Professor Jean Beard will give a talk on the history of the College of Science in rooms 255/257 of the Martin Luther King Library, with a reception to follow (RSVP at 408-924-4805 or rsvp@science.sjsu.edu). On Friday, May 4, we will host the annual COS Student Research Day outside Duncan Hall from 10AM to 2PM. I hope you can join us at one or both of these events. On May 4, the SJSU campus will also celebrate Founders' Day, with a number of events and lectures, including a panel of presidential speakers focusing on the university's history and its role in the region. Full details can be found at www.sjsu.edu/150TH.

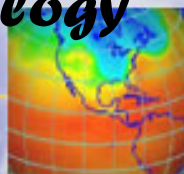


CSU Student Teams Score in ACM Coding Contest

In 2006, for the second year in a row, a team of students from the Computer Science (CS) department scored well in the Association for Computing Machinery (ACM) Pacific Northwest Programming Contest. Last year's team, consisting of Michael Butler, Johan Johansson, and Glenn Jahnke, ranked 12th, only slightly behind such powerhouses as Stanford and UC Berkeley. In 2005, a team consisting of Butler, Johansson, and Thang Dao, also ranked 12th

in the competition. This is an outstanding achievement and, averaged over both years, the best result of any CSU campus in Northern California! Last year, the CS department also fielded a second team consisting of Glen Lenker, Tim Stanke, and Andy Manoske, who were successful in solving several of the problems. Congratulations and thanks to these distinguishable students for representing SJSU and the CS Department so well!

Meteorology Update



In the spring of 2006, SJSU's Meteorology department had the high honor of winning the National Collegiate Weather Forecasting Contest (NCWFC). This annual contest comprises students, faculty and staff competing from over 40 meteorology departments across the U.S. and Canada. The SJSU team of five undergraduate students took first place in the overall standings, defeating long-time nemesis MIT. In addition, senior SJSU student Massoud Fazal won the individual forecasting award out of 1066 contestants! Two other SJSU team members, Mike Delman and Nick Osterloh, finished in the top ten of the individual competition as well.

NCWFC spans the fall and spring semesters. Contestants forecast daily maximum and minimum temperatures, as well as precipitation amounts and maximum wind speeds for specified locations. The forecasts are submitted

daily, Monday through Thursday, for two consecutive weeks. As you can see, SJSU's win was not a case of a single lucky forecast. At the conclusion of the competition, each contestant (or team) had submitted eighty forecasts! Our team's success reflects their hard work, dedication, and accuracy! Congratulations to our forecasting team and to their instructor, Mike Voss!



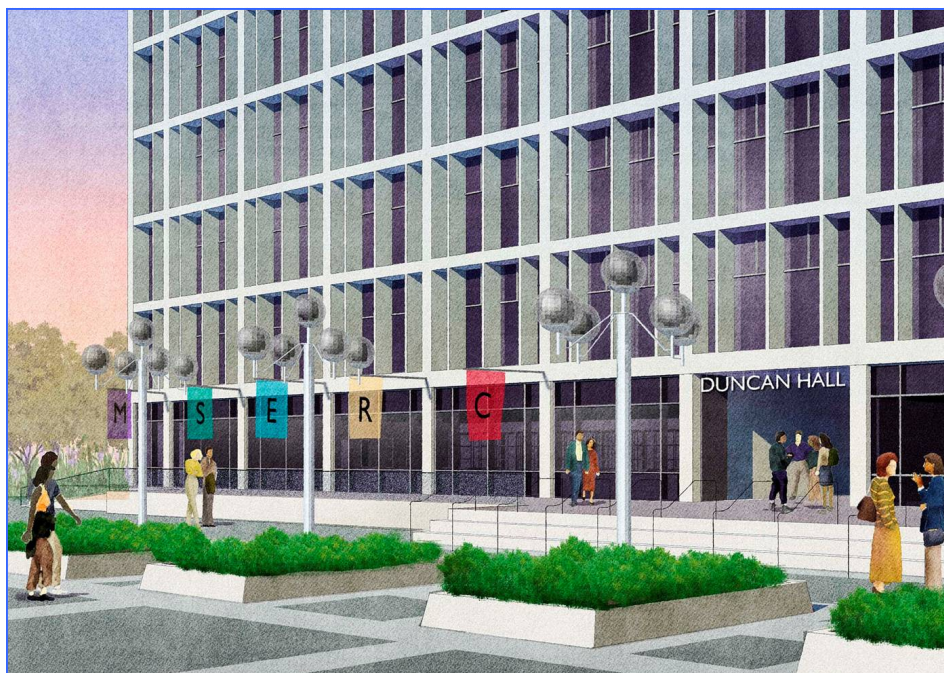
San José State Senior Forecasting Team:
Clockwise are: Nick Osterloh (seated in orange tee), Mike Delman, Kim Campo, Jeff Olevson, and national champion Massoud Fazal.

K-12 Math and Science Education Resource Center

The College of Science, in conjunction with University Advancement, is in the middle of a capital campaign to raise funds to construct and outfit the new K-12 Math and Science Education Resource Center (MSERC) that will serve the professional development needs of local K-12 math and science teachers. Our capital campaign is being conducted jointly with the organizers of the Intel International Science and Engineering Fair (ISEF) that will be held in San José in 2010. We are excited that ISEF 2010 has selected the MSERC project as their legacy piece.

The State of California's history of inadequate public school funding has hampered the ability of school districts to provide the necessary laboratory equipment and hands-on "manipulatives" for teachers to employ a student-centered and inquiry-based curricula that encourages motivation and learning. Most fourth through eighth grade math and science teachers have minimal education in these content areas and do not feel comfortable with the newer approaches to instruction. Hence, the College of Science, with the support of the Colleges of Education and Engineering, has accepted the challenge to provide local teachers with the materials and the training to use them. This will help supercharge the math and science curricula so students can excel in these important subjects.

The new Center will have three primary emphases. First, a large collection of kits, meeting Statewide and National Teaching Standards, will be available for teaching math and science. Sec-



The future look of Duncan Hall.

ond, professional development workshops for teachers will be regularly offered to demonstrate how to best use the curricular kits in their classrooms. Third, SJSU faculty, both current and retired, will be available to help advise both students and teachers with science fair projects.

A curricular kit consists of equipment and supplies for use in teaching a complete unit of study, defined as a conceptually well-designed series of daily lessons that covers one to several weeks of integrated and engaging instruction. The math kits are designed to be checked out to a teacher or small group of teachers for an entire academic year. For science, there will be a large collection of kits covering all the necessary concepts. Many such kits are commercially produced by such organizations as the Lawrence Hall of Science at Berkeley and the National Center for Science Education in Washington, D.C. In collaboration with our partners, the Tech Museum and the Santa Clara County Biotechnology Education Partnership (SCCBEP), we will generate other kits as part of our professional development efforts.

The new MSERC will be housed in Duncan Hall of Science. The plans are to enclose the ground floor

breezeway of Duncan Hall on the San Salvador Street side of the building. The decorative glass enclosure will result in a modern suite of rooms that totals 13,000 square feet. Most of the space will be devoted to storage and check out of the kits, but some space will be devoted to a model classroom outfitted with the newest technology for teaching. The model classroom will have space flexible enough to be converted quickly into a meeting room or a computer classroom.

Math and science teachers throughout our service area will have access to the Center's materials and activities. Our service area consists of all or parts of the counties of Santa Clara, Santa Cruz, Alameda, San Mateo, and San Benito. Eventually, we plan to acquire one or more vans for delivery of the kits to teachers at their school sites, thus saving the teachers the inconvenience of driving to SJSU.

The plan is to have the MSERC fully operational prior to the 2010 Intel International

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SAACS Donation Starts SCCBEP Forensic Science Kit

The popularity of television shows like the CSI franchise launched an ardent interest in the life sciences, as well as created a generation of couch "experts" in forensic science. Television shows seemingly solve crimes in less than an hour; most of us know this doesn't occur in reality. The actual science of forensics involves a broad knowledge of biology, chemistry, spectroscopy, and physics. Such investigation requires days to weeks (not hours!) in order to solve a crime. The various criminalists employed in a crime lab work as a team using their expertise in a wide range of disciplines, unlike the one or two celebrities in a TV show that appear to solve the crime completely by themselves. The scientific techniques used in forensics often involve more than a single micropipette or instrument which functions as an all-in-one gel electrophoresis, DNA sequencer, and gas chromatograph. "Young students are eager to learn the chemistry-based techniques that underlie crime scene investigations," says Dr. Daryl Eggers (Department of Chemistry), "They already see where this knowledge has a direct application, and I suspect that many students dream of solving a true murder mystery one day."

With the help of the Student Affiliates of the American Chemical Society (SAACS chapter at SJSU), the Santa Clara County Biotechnology Education Partnership (SCCBEP) has launched a mobile Forensic Science kit for the high school science classroom based on the field-tested curricula of Mr. Mark Okuda (former biotech and forensics teacher at Silver Creek High School, San José) and Dr. Frank Stephenson

(Applied Biosystems, Foster City). The kit supports several engaging hands-on labs ranging from blood splatter analysis to the use of the Nobel Prize winning polymerase chain reaction (PCR) technology to analyze DNA samples for the variable number of tandem repeats at the D1S80 locus. "Forensics is truly an interdisciplinary science requiring knowledge in the fields of biology, chemistry, physics, mathematics," says Mr. Mark Okuda, "It brings relevance to the theory and concepts learned in their core (high school) science courses to real world applications."

SCCBEP is a non-profit sponsored program in the Department of Chemistry at SJSU. The organization was started by educators to train teachers in the science and techniques of biotechnology and to assist in classroom implementation by bringing access to expensive equipment, supplies, and reagents into the classroom. Donations and grants subsidize the mobile curricula based kits, teacher workshops, and staff. Currently, labs ranging from simple transformations to mitochondrial DNA sequencing based on PCR are exciting students in 7th to 12th grade classrooms. "The training invested in science teachers and the availability of this Forensic Science kit," says Dr. Katy Korsmeyer (Program Director), "will engage high school students in science disciplines and strengthen the link with higher education."

SAACS, run by a student board with faculty advisors, is the SJSU chemistry club. The sale of lab manuals funds scholarships and awards for SJSU chemistry students and an annual celebration Winter Dinner. The donation to SCCBEP for funding of the new Forensic Science kit was presented by SAACS officers to Dr. Korsmeyer at the Silicon Valley Capital Club in November. The Forensic Science kit will be used by six schools in Santa Clara County this spring.

For more information:

SCCBEP (<http://www.science.sjsu.edu/SCCBEP>)

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SAACS donated funds to SCCBEP for supplies to construct a high school Forensic Science mobile kit. Left to right: Rachel Fulton (President, 2006-07), Dr. Daryl Eggers (Chemistry), Khan Van Tu (Vice-President), Beth Zito (President, 2005-06), Dr. Patrick Fleming (Chemistry), Julie Nguyen (Secretary), and Dr. Katy Korsmeyer (SCCBEP Program Director).

Dr. Dan Goldston: Prime Number Theory

Professor Dan Goldston of the Mathematics Department has been studying the gaps between prime numbers with the ultimate goal of proving the famous twin prime conjecture that states there are infinitely many pairs of primes two apart. The results of Professor Goldston and his colleagues, Professor Cim Yildirim of Istanbul University in Turkey, and Janos Pintz of the Alfred Renyi Mathematical Institute in Budapest, Hungary, have been featured in a variety of publications from the Wall Street Journal and Science magazine to our local San José Mercury News.

Professor Goldston has been studying gaps between consecutive prime numbers for over 25 years since his days of graduate school at UC Berkeley. The recent research of Dr. Goldston and his colleagues shows that the smallest gaps between consecutive primes gets arbitrarily small compared to the average gap as the primes become larger.

Professor Goldston and his Turkish colleague Cim Yildirim first announced their result in 2003. However, Andrew Granville of the University of Montreal in Quebec, and Professor Kannan Soundararajan from the University of Michigan found a mistake in a small subsection of the original proof. The rest of the proof was fine, and part of it immediately enabled two other mathematicians, Terence Tao of UCLA and Ben Green of the Pacific Institute for the Mathematical Sciences in Vancouver, to make a major breakthrough in studying arithmetic progressions of primes.

In 2004, Professor Goldston came up with an idea for a new approach to prove the result. He

worked out the details and presented his new proof during a number theory conference in Oberwolfach, Germany. This time, however, he discovered there was a mistake in the very last step of the proof. Fortunately, Professor Janos Pintz from Bulgaria took a close look at it and came up with a key insight for fixing it. Goldston, Pintz, and Yildirim started working together in December 2004. By February 2005, they had come up with a complete proof. This latest research seems to show that there are infinitely many pairs of primes that are no more than 16 apart. They circulated a manuscript of the new proof theory to a handful of experts asking them to check it for any errors. Not only did the experts find no errors, they found a much simplified and shortened version of the proof! Professor Yoichi Motohashi of Nihon University in Japan found a shortcut that led to a surprisingly short eight-page proof of the result. Experts are now convinced that Professor Goldston and his colleagues have unearthed a rare mathematical gem that is one of the most exciting results about prime numbers in the last 50 years. There is hope that this breakthrough will lead to a proof of the twin prime conjecture itself, as mathematicians have been working on it for hundreds of years.

Dr. Goldston's research has been featured in over 40 publications explaining his fundamental work on the spacing of primes. During the past 3 years, he has also given more than twenty talks throughout the world, including Cambridge (England), Penn State, Princeton, University of Michigan, Columbia, UC Berkeley, and UC Santa Cruz. Dr. Goldston and his colleagues plan to

write a book about their recent discoveries on prime number theory.



Dr. Dan Goldston

remains dedicated to his students at San José State. He goes above and beyond the call of duty in helping them learn mathematics not only when they are in his classes, but also in subsequent years as he counsels them in selecting courses and making career choices. Dr. Goldston has also been engaged in research with several of his students both undergraduate and graduate, and some of this research has been presented in talks and workshops. Dr. Goldston still meets with one of his former Master's degree students, who is completing his Ph.D. in Mathematics. He supports this student, both intellectually and financially, in pursuit of their mutual goal of finding the proof of the twin prime conjecture. Despite being known to the world for his achievements in prime number theory research, his fame has not diminished his ongoing dedication to his students.

In spring 2006, SJSU President Kassing bestowed upon Dan Goldston the 2006 President's Scholar Award, SJSU's highest academic honor. For the last two years, Dan has also been the SJSU nominee for the Wang Family Award of Excellence in the Science and Engineering Divisions, the highest a member of the CSU faculty.

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Prime Number Theory

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We are proud and pleased to have Dan Goldston in the Math Department and the College of Science at San José State University.

K-12 Math and Science Education Resource Center

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Science and Engineering Fair so that our efforts can support the large cadre of talented local students who enter their projects in levels of competition, and hopefully, continuing with success on to the national, and finally, the international levels. Presenting an intriguing science fair project sends most students on the path to a career in science, technology, engineering, or mathematics. As Silicon Valley continues to search for more talented graduates, the MSERC will assist in filling this need to keep our local industries at the forefront of their fields. The House Family Foundation recently donated \$500,000 for the building construction. An anonymous donor gave \$250,000 for operational needs.



MSERC

RUMBA Program Exposes Undergraduates to Molecular Biology Research (and Improves Their Dancing Skills)

Since 2004, a group of faculty from the Department of Biological Sciences have donated much of their summer working with talented undergraduate students from underrepresented groups as part of the NSF-sponsored RUMBA (Research by Undergraduates Using Molecular BIOLOGY Applications) program.



RUMBA students in action.

Currently, seven SJSU biology professors sponsor student research in their labs as part of the program. Those applicants who are accepted to this selective program come to San José from all around the country. Student participants spend their ten weeks on campus as a team working and learning together to prepare for the research symposium SACNAS (Society for the Advancement of Chicanos and Native Americans in Science), which occurs late in the year.

Potential research projects include molecular forensics, studies of cell repair and mutagenesis, molecular genetic studies of marine communities, molecular characterization of bacteria, identification of genes from venomous snakes, and regulation of gene transcription.

The students and their faculty mentors also enjoy a number of non-academic activities which have included field trips, concerts, dinners, and those infamous RUMBA dance lessons that give the program its name.

When co-founder Leslee Parr was asked why she gives up ten weeks of her summer to mentor RUMBA students, she replied, "We change students' lives in the program. We do things in the program that only Master's and Ph.D. students normally do, so they see themselves as capable of doing research."

Over the last three years, students have come to the program from SJSU, from local community colleges, and increasingly from universities throughout the nation. For this summer's program, the Principal Investigator (PI), Julio Soto, and his colleagues have the difficult task of sifting through over 50 applications to obtain the select group of participants. For more information on RUMBA, visit the program's web site: <http://www.biology.sjsu.edu/rumba/RUMBA.html> or contact Dr. Soto at Jsoto3@email.sjsu.edu.

2006 G.O.L.D. Award Bestowed Upon Dr. Jason Rasgon

Dr. Jason Rasgon was a recipient of the G.O.L.D. (Graduate of Last Decade) Award this past Fall. This award goes to an SJSU graduate from the previous decade who has achieved extraordinary success in his/her field of study.

Jason graduated from the Biological Sciences department as a Dean's Scholar in May 1998. Jason's interests are in the population biology, ecology and genetics of arthropods (e.g. insects) that function as disease vectors. While at SJSU, he worked with Dr. Michael Sneary on his senior research project in zoology. This project was funded by the Minorities in Research Careers (MARC) program administered at SJSU by Dr. Herb Silber, and by the National Institutes of Health (NIH). MARC is an honors program for outstanding under-represented minority students whose career goal is to obtain a Ph.D. or MD/Ph.D. degree in the biomedical sciences.

MARC students are required to do an on-campus research project. In Dr. Sneary's lab, Jason mastered a technique to investigate the minute structural details of a biological sensor. This structure provides animals with a seismic sense (sensitivity to ground-borne vibrations). His experience provided him with an introduction to the rigorous demands and rich rewards of research and laid a strong foundation for his future studies.

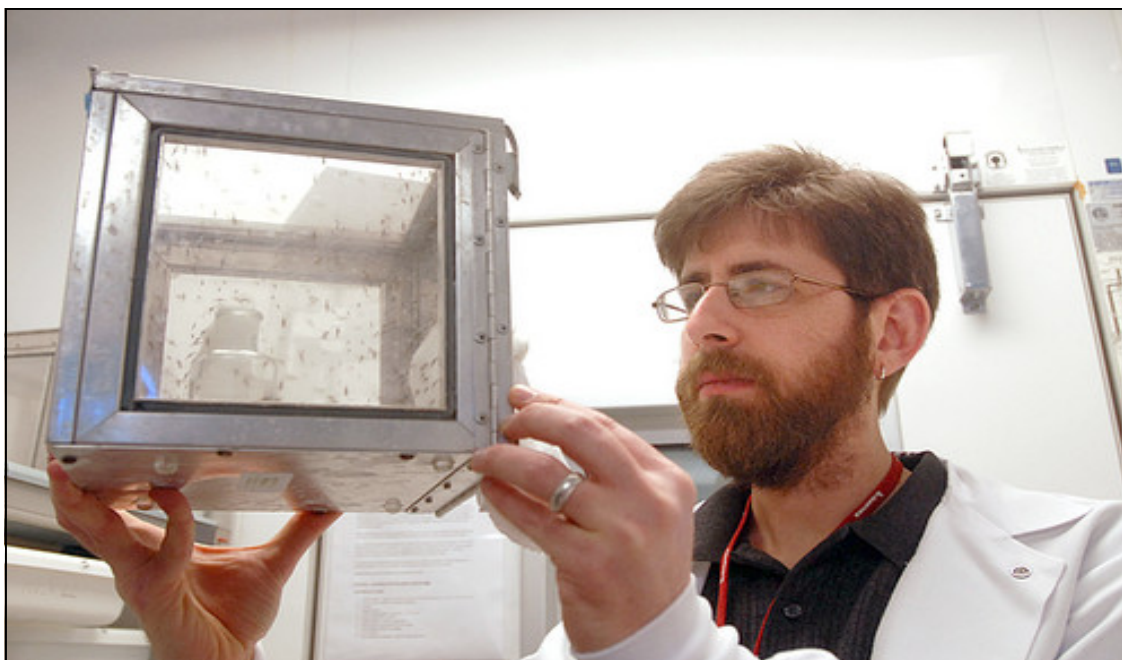
MARC students are also required to spend a summer away from their home campus. Jason went to U.C. Davis where he completed his Ph.D in Entomology. While there, he was funded by a NIH MARC Graduate fellowship.

In 2005, he was appointed as an Assistant Professor at the Malaria Research Institute and the department of molecular microbiology and immunology at Johns Hopkins' Bloomberg School of Health in Baltimore, MD. He main-

tains an active research group and is developing an outstanding record of funded research from NIH/NIAID and has published numerous works in various scientific journals. For more information on Dr. Rasgon, visit his webpage at: <http://faculty.jhsph.edu/?F=Jason&L=Rasgon>.

"My approach to research has always been very interdisciplinary, ranging from the effect of individual genes to population-level questions."

-Dr. Rasgon



Dr. Jason Rasgon examines mosquitoes in his lab at John Hopkins.

Faculty News

Biology



Molecular Biology

BRANDON WHITE (Ph.D. 2005, University of Alabama). Dr. White joined our faculty in January following a postdoctoral appointment at the Scripps Research Institute, where he worked with Nobel Laureate Gerald Edelman, and a research position at the Salk Institute. Dr. White's principal research interest is in the structure, regulation, and expression of notch genes, and the roles their signaling play in cancer and in the function of the adult nervous system.

Chemistry



Biochemistry

MARC d'ALARCAO (Ph.D. 1983, University of Illinois). Dr. d'Alarcao comes to us from Tufts University, where he served as Associate Professor and previously as Department Chair. Dr. d'Alarcao has 30 publications, two patent applications, and one provisional patent in the area of organic synthesis and in the regulation of various organic compounds on activity of mammalian cells. His current areas of interest include the development of new drug delivery strategies, including electrochemically-degradable polymers.

Organic Chemistry

DAVID BROOK (Ph.D. 1993, University of Colorado). Dr. Brook's area is the synthesis, magnetic properties, and coordination chemistry of stable free radicals and other para-

magnetic molecules. He was Associate Professor of Chemistry at the University of Detroit Mercy. More recently, he has held an appointment as a Research Professor at Santa Clara University and has taught organic chemistry at San José State. He has 18 journal publications, and a strong record of grant support from the Petroleum Research

Geology



Environmental Geology

MANNY GABET (Ph.D. 2002, UC Santa Barbara). Dr. Gabet is joining our faculty from an appointment at UC Riverside. His specialty is environmental sedimentology focusing on debris flows, landslides, and erosion rates. He has over 20 publications with several more in press, and has received grant support from the USDA, NSF, and the Center for Wildlife and Water Resources.

Paleoceanography/Paleobiology

JIM KLAUS (Ph.D. 2005, University of Illinois). Jim Klaus comes to us from a postdoctoral appointment at the University of Miami. Dr. Klaus' interests are in tracking changes in structure of coral reef communities over time and in the roles that environmental effects play in reef evolution. Dr. Klaus has published six papers, with three more in press, and has won numerous awards for both his teaching and research.

Mathematics



Statistics/Applied Mathematics

MARTINA BREMER (Ph.D. 2006, Purdue University). Martina Bremer's research is in the area of statistical bioinformatics. She also has an MA in Applied Math and a strong interest in math and science education. Dr. Bremer is very interested in teaching biological applications to math and statistics students, and in teaching biology students how to apply math and statistics.

Meteorology



CRAIG CLEMENTS (Ph.D. 2007, University of Houston). Craig Clements studies the meteorology of fire zones, coastal regions, and mountain valleys. He has four publications, one in revision, and three more submitted. He received a US Department of Energy fellowship for his graduate research. Dr. Clements has already taught meteorology at the community college, undergraduate, and graduate levels.

THE SCIENTIST

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